Committee on Resources

Subcommittee on Energy & Mineral Resources

Statement

STATEMENT OF
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Madam Chairman and Members of the Subcommittee, thank you for this opportunity to discuss the Administration's FY 2001 Budget Proposals for the Geology Programs of the U.S. Geological Survey (USGS). For FY 2001, the budget requests a total of $224.8 million for USGS programs addressing geologic hazards, resources and processes. This level of funding represents a net increase of $13.6 million, or approximately 6 percent, above the FY 2000 enacted level for these programs. The FY 2001 budget request proposes increases in earthquakes, volcanoes, earth surface dynamics, and geologic mapping, and also proposes net reductions in minerals and energy programs. The balance of my statement will discuss significant accomplishments and proposed budget changes for FY 2001 for each of the major categories of USGS Geology Programs.

GEOLOGIC RESOURCE ASSESSMENTS

As you know, we conduct basic and applied research on geologic resources and on the environmental and economic impacts of their extraction and use to provide reliable, impartial scientific information and comprehensive analyses of the resources of the Nation and the World. Major consumers of our products are the land and resource management bureaus of the Department of the Interior, Federal environmental and national security agencies, State geological surveys, the energy and minerals industry, and the environmental community.

In Energy Resources, we face the simultaneous challenges of an expanding energy appetite, an increasing dependence on imported oil, and an increasing demand for energy resources with minimal accompanying environmental effects. The Energy Information Administration (EIA) Annual Energy Outlook 2000 forecasts that worldwide energy consumption will increase 27% between 1998 and 2020 due to growth of the world economy. In the United States, forecasts for the next 20 years indicate that natural gas consumption will increase 40%, coal consumption will increase 20%, and petroleum demand will grow 29%, in part due to a predicted 60% decline in nuclear electricity generation capacity. Even now, natural gas consumption in the U.S. is at an all time high.

To meet these increasing demands for energy resources, the USGS Energy Resources Program is addressing

several avenues of future energy resource availability. A new National Oil and Gas Assessment will quantify the natural gas endowment and the potential for additional reserves of oil and gas from existing fields in the United States, exclusive of Federal waters. Previous work tells us that our remaining energy supply will come from these sources and from imports. Research starting in

FY 2000 and continuing to FY 2004 will focus on regions of the Nation that have high potential for future production of conventional and unconventional natural gas resources and newer, less well known sources such as coal-bed methane in Wyoming, the Gulf Coast, and Alaska and gas hydrates in Alaska and the Gulf Coast. In addition, the 1990 Clean Air Act Amendments and concern about greenhouse gas emissions to the atmosphere, indicate that natural gas, the cleanest burning fossil fuel, will be more in demand. National Oil and Gas Assessment efforts in FY 2000 and FY 2001 will focus on Alaska, the Appalachians, Colorado, the Gulf of Mexico, Texas, Utah, and Wyoming.

Because we rely on imports for much of our energy resource needs, the location of worldwide resources is increasingly important. Currently, more than 50% of the oil we use is imported; in 20 years, this could rise to 64%. In FY 2000 we will release a World Energy Assessment of the most productive oil and gas provinces of the world that contain about 95% of the world's oil and gas resources. This assessment will be the first of its kind to include a rigorous geologic foundation for remaining resource volumes, and the first to make those data available to the entire geoscience, business, and research community. Results of the assessment will be presented in briefings later this spring and the results will be published in time for the World Petroleum Congress in Calgary this summer. Assisting us in this effort are the U.S. Departments of Energy, Defense, and State; U.S. Agency for International Development; Energy Information Administration; International Energy Agency; the intelligence community; and over two dozen industry partners. In FY 2001, the World Energy Assessment effort will focus on global unconventional gas resources in anticipation of advances in gas-to-liquids technology and the future availability of those liquids for export.

The Energy Resources Program is assessing coal resources that will be used in the first quarter of the 21st century. This intensive, multi-year assessment of the quantity, quality, availability, and recoverability of coal involves the generation of digital databases and use of geographic information system (GIS) technology to facilitate quantitative estimation of coal resources. The results will be used by Federal and State land managers to support land-use decision making, by environmental regulators to evaluate compliance with regulations stemming from the 1990 Amendments to the Clean Air Act, and by economists to forecast economic trends at regional and national scales. Electric utilities, coal producers, and coal consumers also will use these results and products for evaluating the availability and quality of coal feedstock to electricity generating power plants and to achieve compliance with emission standards and other environmental regulations. The comprehensive summary of national coal resources is scheduled for release in FY 2000, although reports on individual regions are being released as they are completed. The study will form the basis for addressing the challenge of future changes in the energy mix as the Nation responds to increasing demands for cleaner burning coal. When the national assessment is completed, our focus will shift to integrating the new digital resource information with national and global digital inventories of coal quality. The resulting integrated database will allow the USGS to provide critical information to land and resource managers who will manage the Nation's ever increasing need for energy while protecting the environment and human health.

The USGS National Coal Quality Inventory (NaCQI), a database of the chemistry of coals used in power plants, has been established recently and will expand through collaboration with State geological surveys

and the Electric Power Research Institute. The database will continue to grow by adding new data about the coal that we anticipate will be mined in each region of the United States during the coming decade. These digital data will enable Federal and State regulatory agencies, electric power utilities, and the coal industry to quickly access and display detailed coal quality information to address air quality issues and to maintain compliance with the 1990 Amendments to the Clean Air Act. NaCQI also will be a valuable scientific tool for evaluating the feasibility of achieving CO_2 and other greenhouse gases emission targets.

The Energy Resources Program has developed an energy resource decision support system, called Geo-Data Explorer, or GEODE. This software is designed to assist land and resource managers by delivering spatially referenced digital energy, cultural, and environmental data via the Internet using standard World Wide Web technology. Wise stewardship of federally managed lands requires detailed knowledge of domestic energy-resource availability, quality, and distribution, and GEODE will enable us to integrate that resource knowledge with other environmental and land-use information. Because Federally managed lands contain a large proportion of the remaining energy resources of the U.S., it is important that land-use decisions concerning energy-resource development be made within the context of the energy-resource endowment and energy-mix goals of the Nation. GEODE can be accessed at http://geode.usgs.gov/.

In this budget a $0.5 million increase is proposed to support state and local government efforts to integrate and analyze digital geospatial data needed for local land and resource management decisions using GEODE. These data sets may include land ownership, resource distribution, satellite imagery, infrastructure networks, hydrology, zoning boundaries, and data from other USGS programs as needed.

The proposed reduction of $2,509,000 will phase-out several economic and environmental studies. By the end of FY 2000, preliminary maps related to these studies will be produced showing the regional distribution and severity of acid mine discharge and mine pool blow outs in the Central Appalachians. This decrease will also eliminate funding for the Coal Availability/Recoverability Studies collaborative project with the State Geological Surveys to fund higher priority programs elsewhere in the budget.

In the area of mineral resources, the USGS Mineral Resources Program is the sole Federal provider of scientific information on mineral potential, production, consumption, and environmental behavior. Minerals and mineral products are important to the U.S. economy; in 1998 processed materials of mineral origin accounted for an estimated $415 billion, about five percent of the gross domestic product. USGS minerals research and information are used to characterize the life cycles of mineral commodities from deposit formation and discovery to mineral recycling. Analyses based on these data are critical to the formulation of economic and environmental policy and also provide land managers with decision options when there are conflicting demands for resources. USGS continues to increase the availability and usefulness of its minerals data by designing and implementing methods for integrating and delivering spatially referenced digital data via the Internet using standard World Wide Web technology and software. USGS minerals information and research is available on the World Wide Web at http://minerals.usgs.gov/.

USGS Mineral Resources Program research addresses the challenges of understanding how mineral resources occur and interact with the environment, and of developing methodologies for predicting occurrence and amount of undiscovered mineral deposits. Current projects include collaborative work with Federal land managers aimed at understanding the origins and environmental consequences of the lead-zinc deposits of southeastern Missouri. USGS research has provided a basis for interpreting geophysical surveys in Tongass National Forest, southeast Alaska, which were supported by federally appropriated funds to Bureau of Land Management (BLM) and the City of Wrangell. As part of this work, the USGS identified a larger area prospective for mineralization than previously known, as rock units that host numerous mines

and mineral deposits in southeastern Alaska, including the Greens Creek mine and the Windy Craggy prospect, are exposed over a broader area than previously thought. New geologic, geochemical, and geophysical modeling of basin formation in the arid southwest includes detailed analysis of new geophysical data which shows extensions of known mineral districts beneath the edges of the basins, providing information valuable both for predicting water quality and for mineral resource exploration.

USGS assessments of the distribution, economic significance, and environmental impact of development of the Nation's mineral resources are conducted on regional, national, and global scales to meet the needs of land-management agencies and national policy makers. In response to the need to update and maintain urban infrastructure, the Mineral Resources Program is increasing its emphasis on assessments of aggregate resources, such as sand, gravel, and crushed stone. Ongoing work in the Front Range of Colorado brings together minerals, energy, water, and biological resource scientists who are developing new ways to describe the relationships between aggregate, water, energy, and biological resources and to predict both the availability of the non-renewable resources and the effect their extraction might have on the living resources. The results of this project are intended to be transferable to additional arid and semi-arid regions experiencing rapid growth. Other current activities include projects in National Parks, National Forests, and BLM Resource Areas that provide geospatial minerals, geologic, geochemical, and geophysical information for land stewardship and management plans; national geospatial databases that allow rapid response to land management concerns; materials flow analyses of key minerals in the economy and environment; and minerals information on over 100 commodities on a monthly, quarterly, semi-annual, and annual basis.

The abundance, compositions, and environmental availability of minerals or their contained elements in rocks and soils define the geochemical landscape and directly influence nutrient availability, toxic element concentration, vegetation distribution, and the status of ecosystems. The USGS National Geochemical Database is a digital repository of about 70 million analytical determinations made on approximately two million samples of geologic material such as rocks, stream sediments, and soils. These data provide geochemical information for approximately two-thirds of the land area of the U.S. During FY 1999 and FY 2000 Mineral Resources Program scientists and data managers have made major improvements in the reliability and accessibility of this critical database. Original paper records have been scanned and organized into an historical archive, safeguarding against loss due to fire, theft, or other disasters. By mid FY 2000 all samples from Alaska that were analyzed in USGS labs (about 160,000 samples) will have been reviewed, corrected, and made available in the World Wide Web. An additional 92,000 samples from Montana and Idaho have also been reviewed and updated. Samples collected by the National Uranium Resource Evaluation program in the late 1970s and early 1980s have been made available on the World Wide Web for all of 17 states and parts of four others.

The growing need for mineral resources worldwide raises questions of sustainability and responsible resource utilization. The Mineral Resources Program conducts geologic, environmental, and public health studies in cooperation with land-management agencies, biologists, medical professionals, States, universities, and industry. Current activities include examining how minerals affect ecosystem status in northern Idaho and western Montana; assessing abandoned mine lands in Colorado and Montana; characterizing the source, transport, and fate of toxic elements, particularly mercury and arsenic, in Alaska, California, the Upper Midwest, and the Eastern states; and developing regional and national geologic, geochemical, and geophysical baseline and background maps and databases required for evaluating the status of our Nation's lands.

USGS minerals research leads to the development and implementation of new technologies that advance studies of mineral resources and are applicable to solving other important problems such as mapping

earthquake and volcanic hazards, location and evaluation of energy resources, characterization of hydrology, or location of buried ordnance. Recent mapping of the floor of Yellowstone Lake is an example of the benefits of this approach to technology transfer. Recently completed high-resolution sonar imaging, seismic reflection, and magnetic surveys of the northern part of Yellowstone Lake show a bottom covered with dozens of circular depressions and hundreds of spires and pinnacles protruding from the floor. Formation of both spires and circular depressions is related to deep-seated fluid circulation in the Earth's crust and has occurred over the past 12,000 years. The spires in Yellowstone Lake are formed by venting processes similar to those that occur on the ocean floor, one of the processes which produce rich mineral deposits such as Red Dog, Alaska, the world's largest zinc deposit.

In this budget, a $1.2 million increase is proposed that will permit the Mineral Resources Program to expand development of decision support systems needed by land managers dealing with natural resources issues such as sand and gravel and the historical impact of mining.

A proposed reduction of $3.2 million will (a) conclude a planned three-year collaboration between USGS and other Federal agencies, State agencies, universities, Native corporations, Alaska libraries, and industry to improve access to mineral information in Alaska, and (b) end the Mineral Resources Program studies on the origin and environmental consequences of gold deposits in the Great Basin in Nevada.

GEOLOGIC PROCESSES

Economic growth is driven largely by access to the Earth's resources. Geologic maps provide the spatial framework to locate energy resources such as coal, petroleum, and natural gas; construction materials such as sand, gravel, limestone, and building stone; soil and rock types that enhance agricultural productivity; and metals and other mineral resources as diverse as gold and fertilizer. The geologic map remains a keystone product of the U.S. Geological Survey and in FY 2001 the USGS is again making geologic mapping a high priority, proposing a $7.5 million increase for our National Cooperative Geologic Mapping Program as part of the Administration's Lands Legacy initiative (State Planning Partnerships). The Program, established by the National Geologic Mapping Act of 1992 and reauthorized in 1999 as PL 106-148, has been designed so that the Nation will have accurate geologic maps needed to address tomorrow's problems. The development of 3-dimensional digital mapping technology has increased the utility of maps of all kinds. We anticipate increased demand for digital geologic maps in the future because they are one of the cornerstones needed for interpreting information about the Earth. Geologic maps are used by land, water, and natural resource managers at the Federal, State and local levels and by the private-sector to achieve the most efficient use of Earth resources in a way that is at once both sustainable and economically viable.

The USGS Coastal and Marine Geology Program provides geologic information critical to the management of the Nation's coastal and marine environments. Research in the Program addresses four main themes: 1) environmental quality and human health, 2) natural hazards and public safety, 3) natural resources, and 4) technology and information. In FY 2001, as several current coastal and marine geology studies are completed, funds will be used to begin or augment high priority studies in three areas: effects of coastal storms, sediment-hosted pollution in the lower Mississippi River, and Coral Reefs. An increase of $0.5 million will support geologic research to investigate the influence of geomorphic change and sedimentation on the quality of salmon and trout habitat in the Columbia basin. Channel morphology and sediment processes are important factors for modeling hydraulic flow, temperature, and sediment transport. Pilot studies will focus on representative segments of the Columbia River and selected tributary watersheds. The research will integrate geologic data with other information in a Geographic Information System (GIS) for the Columbia River basin. Because natural and human-induced changes to geologic systems fundamentally

influence habitat quality and the aquatic productivity, the predictive models and decision support systems for the Columbia basin will take them into account. There is also a proposed reduction of $0.5 million associated with completion of a pilot project using Light Distance and Ranging (LIDAR) technology to evaluate and monitor habitat of Chinook Salmon and Summer Chum Salmon.

The USGS will continue its close affiliation with other federal agencies under the auspices of the U.S. Global Change Research Program. Areas of emphasis are on the human dimension of environmental change, which includes understanding the sensitivity of regional systems to human activities and land use and the impacts of global and regional environmental change to human health; on understanding the impact of climate change and land use on the carbon cycle and carbon sequestration in soils and sediments; and on better understanding the role of land-use change and associated erosion, sedimentation and biological processes on carbon storage and nutrient cycles in wetlands and riparian areas.

GEOLOGIC HAZARDS

USGS scientific information also reduces the impact of natural hazards and disasters on human life and the economy. A wide variety of natural hazards - earthquakes, volcanic eruptions, landslides, coastal and solar storms, and erosion threaten the U.S. economy and population every year. Though we cannot prevent the events, losses can be reduced if scientific information is made available and used by affected communities. Improved planning and emergency response; adaptations to social, economic, and engineering structures; and real-time warning capabilities reduce the loss of life and economic impact of natural disasters - these objectives require information about the nature and degree of risk, which the USGS can provide. USGS not only responds to actual events, but also provides information about the fundamental geologic processes that control these hazards, thus improving the foundation for our response.

The USGS has many programs that provide scientific information targeted to specific types of natural disasters. Within the Geologic Division there are programs that are devoted partially or entirely to hazards including Landslides, Earthquakes, Volcanoes, Geomagnetism, and Coastal and Marine hazards:

- The Landslide Hazards Program improves the understanding of causes and mechanisms of ground failure, monitors threatening landslides and forecasts catastrophic movement in certain areas. It provides the scientific basis for land use and emergency planning decisions, cost-benefit analyses of possible loss reduction measures, and determinations of insurance risk.

- The Earthquake Hazards Program is a major component of the National Earthquake Hazards Reduction Program (NEHRP) authorized by P.L. 105-47. Under NEHRP, the USGS identifies and assesses earthquake hazards, monitors seismic activity, and conducts research on strategies that will reduce societal losses in the U.S. During and after earthquakes, USGS assists emergency response officials by characterizing the extent of damage, size and risk from aftershocks and ground failure.

- On an international scale, the Global Seismic Network enhances our monitoring of earthquakes and other ground-shaking events at home and abroad, enabling us to forecast tsunamis and detect underground nuclear tests.

- The Volcano Hazards Program assesses and provides warning information on volcanic unrest. With major observatories and university partnerships in volcanically active areas of Hawaii, western Washington, Alaska, Wyoming, and California, it is well positioned to monitor volcanic behavior that could threaten these increasingly populous areas.

- Another type of natural disaster, induced by solar activity, disrupts satellites, electrical power distribution systems, radio communications, navigation, and geophysical surveys, and can cost hundreds of millions of dollars per event. Geomagnetic storms are monitored by a USGS network of 13 magnetic observatories, which provide near real-time data used by the U.S. Air Force, and NOAA and the private sector mitigate hazards.

- In coastal regions, the USGS focuses much of its hazards work within the Coastal and Marine Program, which helps mitigate losses to coastal areas by improving the understanding of tsunamis and coastal erosion, landslides, earthquakes and the local and regional susceptibility to adverse change.

In FY 2001, the USGS proposes an increase of $2.6 million to expand and modernize its earthquake monitoring in urban areas in the United States according to the plans developed for the USGS Real Time Hazards Initiative and for an Advanced National Seismic System. New instruments will be installed along with fast transmission capabilities to enable nearly instantaneous estimates of earthquake location, magnitude, and assessment of damage. This information is crucial to saving lives, reducing injuries, and protecting critical infrastructure. After an earthquake, maps of the severity and distribution of ground motion are of primary importance to emergency managers and become the basis for recovery and redevelopment. The data are also needed to design and construct new structures. The increase would allow a total of 150 new regional/urban seismic stations to be upgraded in Seattle, WA; Anchorage, AK; the San Francisco Bay Area, CA; Salt Lake City, UT; Memphis, TN; and Reno, NV.

The Volcano Hazards Program seeks an increase of $0.5 million to expand its real-time volcano monitoring capability to an additional high-risk Alaskan volcano to mitigate volcanic risk to aviation. From 1996 to 2000, the Federal Aviation Administration provided $2 million annually for the USGS to install, operate, and maintain seismic monitors at 20 active volcanoes in Alaska's distant and relatively inaccessible Aleutian Islands. These monitors provide information about impending volcanic activity to the aviation community to help aircraft avoid ash clouds. In addition, there is a proposed reduction of $250,000 associated with not extending a cooperative agreement with the University of Hawaii to support monitoring and research activities of the Hawaiian Volcano Observatory.

Again, thank you for this opportunity to review the Administration's FY 2001 Budget Proposals for the Geologic Programs of the USGS. The Geology Program is an integral piece of the entire FY 2001 budget proposal for the USGS to provide science for a changing world. I would be pleased to answer your questions.

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